Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A method for retrieving information from a three dimensional storage medium, the method comprising:

using a three dimensional storage medium comprising an active medium capable of being in two states, wherein a data unit is represented by the ratio between the concentration of the first and second of said two states in a given volume portion of said medium and a data sequence is represented by a sequence of such data units;

irradiating said active medium with light as to concentrate light flux through a volume portion of said storage medium so as to generate in said volume portion a detectable non-linear optical response characteristic of said concentration ratio, the non-linear optical response being related to a $\chi^{(n)}$ process, where *n* is greater than 2, allowing for ~~spatially~~ separating the non-linear optical response from other light signals due to a propagation direction characteristic of the non-linear optical response ~~satisfying phase matching conditions~~;

detecting said non-linear optical response to retrieve information stored in said volume portion; and

tracking a data sequence for retrieving said data sequence in a reproducible manner.

2. (Previously Presented) The method according to Claim 1, wherein the active medium includes stillbene derivatives, azobenzene derivatives, or mixtures thereof.

3. (Previously Presented) The method according to Claim 2, wherein the active medium is embedded in a supporting matrix.

4. (Previously Presented) The method according to Claim 3, wherein the active medium is doped into the supporting matrix.

5. (Previously Presented) The method according to Claim 3, wherein the supporting matrix is a polymer.

6. (Previously Presented) The method according to Claim 5, wherein the active medium is a monomer co-polymerized with the supporting matrix.

7. (Previously Presented) The method according to Claim 3, wherein the supportive matrix is transparent to the light irradiated on it and to the light generated by the non-linear optical process.

8. (Previously Presented) The method according to Claim 3, wherein the supportive matrix comprises polyethylene, polypropylene, polycarbonate, and/or polymethylmetacrilate (PMMThe), and/or other transparent polymeric material.

9. (Previously Presented) The method according to Claim 1, wherein the irradiated light is focused to a spot having a radius of the order of 30 μm of said irradiated light or less.

10. (Previously Presented) The method according to Claim 1, wherein the intensity of the irradiated light is high enough for the generated signal to be independent thereon.

11. (Currently Amended) The method according to Claim 1, wherein the non-linearly generated light signal is separated from other light signals that may exist in the environment by a filter, prism, monochromator or any other optical element known in the art.

12. (Currently Amended) The method according to Claim 1, wherein the non-linearly generated light signal is separated from other light signals that may exist in the environment by satisfying phase matching conditions.

13. (Previously Presented) The method according to Claim 1, wherein the non-linearly generated light is separated

from other light signals that may exist in the environment by phase sensitive detection, a low-noise amplifier, a lock-in amplifier, a box-cars, gated averaging methods or any electronic method known in the art.

14. (Previously Presented) The method according to Claim 1, wherein the large flux in the volume portion from which information is retrieved is achieved by focusing two or more collinear light beams at said volume portion.

15. (Previously Presented) The method according to Claim 1, wherein the large flux in the volume portion from which information is retrieved is achieved by intersecting two or more focused light beams, each of which is monochromatic.

16. (Previously Presented) The method according to Claim 1, wherein the non-linear optical process is a multi photon fluorescence process.

17. (Previously Presented) The method according to Claim 16, wherein the non-linear optical process is a two-photon fluorescence process.

18. (Previously Presented) The method according to Claim 1, wherein the non-linear process is selected from Coherent Anti-Stokes Raman Scattering (CARS), Degenerate Four-

Wave Mixing (DFWM), Raman Induced Kerr Effect Spectroscopy (RIKES), and/or other four-wave mixing processes.

19. (Previously Presented) The method according to Claim 1, wherein the data sequence is tracked via a tracking feedback signal for directing the light spot to a predetermined volume portion of the storage medium.

20. (Previously Presented) The method according to Claim 19, further including correcting tracking errors in the optical storage medium by:

(a) directing a reading spot that is nominally focused on to a track in the optical storage medium,

(b) continually moving the reading spot in axial and radial directions,

(c) receiving a signal having an amplitude which varies according to respective offsets from the track in radial and axial directions,

(d) using the received signal to determine a direction of a respective offset from the track in radial and axial directions, and

(e) adjusting a location of the reading spot accordingly.

21. (Previously Presented) The method according to Claim 20, wherein directing the reading spot includes directing at least two light sources whose volume of intersection constitutes the reading spot.

22. (Previously Presented) The method according to Claim 20, wherein moving the reading spot includes modulating a position of the reading spot with a cyclic function.

23. (Previously Presented) The method according to Claim 22, wherein the cyclic function is substantially sinusoidal.

24. (Previously Presented) The method according to Claims 20, wherein receiving a signal includes:

i) reading a data signal with the reading spot,

ii) multiplying the data signal by a cyclic modulation signal to form a modulated data signal, and

iii) low pass filtering the modulated data signal.

25. (Previously Presented) The method according to Claim 24, wherein low pass filtering includes window integrating the modulated data signal.

26. (Previously Presented) The method according to Claim 1, further including analyzing and processing detected signals and retrieving information therefrom.

27. (Currently Amended) An apparatus (100) for carrying out the method of Claim 1 for retrieving information from a three dimensional storage medium, the apparatus comprising:

a mount (202) for mounting thereon a three dimensional storage medium (102) comprising an active medium capable of being in two states, wherein a data unit is represented by the ratio between the concentration of the first and second of said two states in a given volume portion of said medium and a data sequence is represented by a sequence of such data units;

at least one source of coherent light (104, 106) for irradiating said active medium with light as to concentrate light flux through a volume portion of said storage medium so as to generate in said volume portion a detectable non-linear optical response characteristic of said concentration ratio, the non-linear optical response being related to a $\chi^{(n)}$ process, where *n* is greater than 2, allowing for ~~spatially~~ separating the non-linear optical response from other light signals due to a propagation direction characteristic of the non-linear optical response ~~satisfying phase matching conditions~~;

a filter (152) accommodated in an optical path of light coming from the medium to separate the non-linear optical response from other light signals

a detector (120) for detecting said non-linear optical response to retrieve information stored in said volume portion; and

a tracking unit (125) for tracking a data sequence for retrieving said data sequence in a reproducible manner.

28. (Previously Presented) The apparatus according to Claim 27, wherein said non-linear optical response is characterized by predetermined wavelength, polarization, or both of these characteristics.

29. (Previously Presented) The apparatus according to Claim 27, wherein the at least one source of coherent light includes an active light source.

30. (Previously Presented) The apparatus according to Claim 29, wherein the active light source is a laser.

31. (Previously Presented) The apparatus according to Claim 27, wherein the at least one source for coherent light includes a passive light source.

32. (Previously Presented) The apparatus according to Claim 27, further including an algorithmic error detector

(128) for analyzing and processing detected signals and retrieving information therefrom.

33. (Previously Presented) The apparatus according to Claim 27, wherein the tracking unit (125) is adapted for tracking the data sequence via a tracking feedback signal for directing the light spot to a predetermined volume portion of the storage medium.

34. (Previously Presented) The apparatus according to Claim 33, wherein the tracking unit (125) includes a tracking error correction unit for correcting tracking errors, the error correction unit comprising:

a position modulator (332) for modulating a position of the reading spot,

an error determination unit (333) for receiving a data signal having an amplitude which varies according to respective offsets from the track in radial and axial directions, and is responsive to the data signal to determine a direction of a respective offset from the track in radial and axial directions, which offsets may be fed to the optical unit to correct radial and axial position errors of the reading spot.

35. (Currently Amended) The ~~device~~ apparatus according to Claim 34, wherein the reading spot is a volume of

intersection of at least two light sources focused on the track.

36. (Currently Amended) The ~~device~~ apparatus according to Claim 34, wherein the position modulator is adapted to modulate a position of the reading spot with a cyclic function.

37. (Currently Amended) The ~~device~~ apparatus according to Claim 36, wherein the cyclic function is substantially sinusoidal.

38. (Currently Amended) The ~~device~~ apparatus according to Claim 34, wherein the error determination unit includes:

a multiplier (340) for multiplying the data signal by a cyclic modulation signal to form a modulated data signal, and

a low pass filter (341) for low pass filtering the modulated data signal.

39. (Currently Amended) The ~~device~~ apparatus according to Claim 38, wherein the low pass filter is a window integrator (341).

Claims 40-51 (Cancelled).